



Predominant weed flora of cropped and non-cropped fields of Bastar in Chhattisgarh

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Southern track of Chhattisgarh has been heavily infested by different weed flora throughout the year. The Southern Chhattisgarh comprises the geographical area of 32.63 lakh ha, out of which 6.56 lakh ha (20.1%) cultivated and 21.63 lakh ha (65%) forest area (Anonymous 2008). The cultivated area of upland have serious weeds problems which reduce the yield of upland crops. Some weeds have dominated this region because of congenial environment leading higher intensity. The crops suffer heavily in early growth stage from the weeds. Critical period of crop weed-competition has been identified as 20-30 DAS in upland capable to reduce the yield production by 47 to 92 % (Bhadoria *et al.* 2000, Yadav 1998). Type of crop and soil properties has greatest influence on the occurrence of weed species (Streibig *et al.* 1984, Andreasen *et al.* 1991). The infestation of weeds is significantly influenced by cropping pattern, weed control measures, moisture availability period and environmental factors (Saavendra *et al.* 1980). Therefore, the knowledge of weed species occurrence in crops of the region is necessary to plan and execute a proper and economical weed management schedule depending.

Survey was carried out in five weed dominated blocks namely Bakawand, Batar, Tokapal, Lohandiguda and Jagdalpur from 7 villages in Bastar district during August-September and February-March, 2008 and 2009, respectively. For studying the composition of weeds in cropped and non-cropped areas, 70 fields were surveyed and routes were planned to establish sampling localities as possible distance of about 5 Kms avoiding inhabited areas and duplication. Five observations on density of individual weeds were recorded per field at single spot using quadrat (0.5 x 0.5m) at 150 metre deep inside the fields as suggested by Raju (1977). Average values of relative weed density, relative frequency of individual weeds and importance value index (IVI) were calculated by given formula for each blocks separately.

$$\text{Relative density} = \frac{\text{No. of individual species}}{\text{No. of total species}} \times 100$$

$$\text{Relative frequency} = \frac{\text{No. of individual species in each block}}{\text{Total no. of species in each block}} \times 100$$

$$\text{Importance value index} = \text{Relative density} + \text{Relative frequency}$$

Weed flora of upland crops

Total 20 weed species were found to infest the upland crops at 20-35 days after sowing. Among these species, 10 species were grasses, 1 was sedges and 9 belonged to broad leaved weeds (Table 1).

In all the blocks, *Spilanthes acmella*, *Celosia argentea* and *Digitaria adscendens* were the most dominant weeds. The respective relative density of these weeds varied from 7.14 to 27.16% in five blocks, but higher percentages (27.16%) of density was recorded by *Spilanthes acmella* in Bastar block. The *Spilanthes acmella* alone constituted 15.17, 27.16, 13.30, 15.17 and 12.02 % in Bakawand, Bastar, Tokapal, Lohandiguda and Jagdalpur, respectively and followed by *Celosia argentea* (Andreasen *et al.*, 1991).

Among grasses, relative density of *Digitaria adscendens* was found to be higher (8.45, 12.35, 7.80, 8.43 and 7.36% in Bakawand, Bastar, Tokapal, Lohandiguda and Jagdalpur, respectively) than other grasses observed on cropped fields. *Setaria glauca* was occupied next to *Digitaria adscendens* in relative density, but little lower in *Eleusine indica* (5.06%) and *Dinebra retroflexa* (5.06%). The relative frequency (RF) and importance value index (IVI) followed similar trend in occupying the floral composition in cropped lands in all blocks of Bastar district. Misra (1968) also recorded *Digitaria adscendens* and *Setaria glauca* as more rampant weeds in upland which need to be controlled on priority basis in early stage of flushing.

Weed flora of Rabi crops

Wheat and mustard are more prominent crops or mixed cropping in *Rabi* under assured irrigation in the region otherwise fields are left in fallow (Rice-fallow system). This system provides good seed bank of weeds for coming *Kharif* season. In *Rabi*, all 70 sites taken under survey were found to infest with 13 major weeds, of which 4 were grassy, 9 broad leaved weeds. The *Rabi* season

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Table 1. Weed flora in different blocks of Bastar district in upland cropping

Upland cultivation	Bakawand			Bastar			Tokapal			Lohandiguda			Jagdalpur		
	RD (%)	RF (%)	IVI (%)	RD (%)	RF (%)	IVI (%)	RD (%)	RF (%)	IVI (%)	RD (%)	RF (%)	IVI (%)	RD (%)	RF (%)	IVI (%)
<i>Celosia argentia</i>	8.43	10.42	18.84	12.35	9.09	21.44	7.80	14.29	22.08	8.43	14.29	22.71	7.36	10.42	17.78
<i>Ageratum conyzoides</i>	6.74	6.25	12.99	8.64	6.06	14.70	6.42	7.14	13.56	6.74	7.14	13.88	6.20	6.25	12.45
<i>Spilanthus acmella</i>	15.17	10.42	25.59	27.16	9.09	36.25	13.30	14.29	27.59	15.17	14.29	29.45	12.02	10.42	22.43
<i>Amaranthus viridis</i>	3.37	2.08	5.45	1.23	3.03	4.26	3.67	0.00	3.67	3.37	0.00	3.37	3.88	2.08	5.96
<i>Physallis minima</i>	1.69	2.08	3.77	0.00	3.03	3.03	2.29	0.00	2.29	1.69	0.00	1.69	2.71	2.08	4.80
<i>Euphorbia geniculata</i>	2.81	4.17	6.98	0.00	4.55	4.55	3.21	3.57	6.78	2.81	3.57	6.38	3.49	4.17	7.66
<i>Mplugo pentaphylla</i>	3.37	4.17	7.54	1.23	3.03	4.26	3.67	3.57	7.24	3.37	3.57	6.94	3.88	4.17	8.04
<i>Phyllanthus niruri</i>	4.49	4.17	8.66	3.70	4.55	8.25	4.59	3.57	8.16	4.49	3.57	8.07	4.65	4.17	8.82
<i>Digitaria adscendens</i>	8.43	6.25	14.68	12.35	6.06	18.41	7.80	7.14	14.94	8.43	7.14	15.57	7.36	6.25	13.61
<i>Eleusine indica</i>	5.06	4.17	9.22	4.94	4.55	9.48	5.05	3.57	8.62	5.06	3.57	8.63	5.04	4.17	9.21
<i>Chloris barbata</i>	2.25	2.08	4.33	0.00	3.03	3.03	2.75	0.00	2.75	2.25	0.00	2.25	3.10	2.08	5.18
<i>Brachiaria raptans</i>	3.37	4.17	7.54	1.23	4.55	5.78	3.67	3.57	7.24	3.37	3.57	6.94	3.88	4.17	8.04
<i>Echinochloa colona</i>	3.93	6.25	10.18	2.47	6.06	8.53	4.13	7.14	11.27	3.93	7.14	11.08	4.26	6.25	10.51
<i>Dactyloctenium aegyptium</i>	3.37	4.17	7.54	1.23	3.03	4.26	3.67	3.57	7.24	3.37	3.57	6.94	3.88	4.17	8.04
<i>Ischaemum rugosa</i>	3.37	4.17	7.54	1.23	4.55	5.78	3.67	3.57	7.24	3.37	3.57	6.94	3.88	4.17	8.04
<i>Dicanthium annulatum</i>	5.06	6.25	11.31	4.94	6.06	11.00	5.05	7.14	12.19	5.06	7.14	12.20	5.04	6.25	11.29
<i>Cyperus iria</i>	3.37	6.25	9.62	1.23	6.06	7.30	3.67	7.14	10.81	3.37	7.14	10.51	3.88	6.25	10.13
<i>Dinebra retroflexa</i>	5.62	2.08	7.70	6.17	3.03	9.20	5.50	0.00	5.50	5.62	0.00	5.62	5.43	2.08	7.51
<i>Paspalum dilatatum</i>	3.37	4.17	7.54	1.23	4.55	5.78	3.67	3.57	7.24	3.37	3.57	6.94	3.88	4.17	8.04
<i>Setaria glauca</i>	6.74	6.25	12.99	8.64	6.06	14.70	6.42	7.14	13.56	6.74	7.14	13.88	6.20	6.25	12.45

RD - Relative density; RF - Relative frequency; IVI - Important value index

was dominated by broad leaved weeds than grassy weeds. Over all *Sphaeranthus indicus* (17.65, 15.14, 22.41, 15.00 and 11.40 % in Bakawand, Bastar, Tokapal, Lohandiguda and Jagdalpur, respectively) was most dominant weeds followed by *Chenopodium album* (14.12, 12.96, 17.14, 20.00 and 14.81% in respective blocks) and *Digitaria adscendens* (12.94, 12.04, 15.52, 15.00 and 7.41 % in Bakawand, Bastar, Tokapal, Lohandiguda and Jagdalpur, respectively). *Melilotus indica*, *Melilotus alba*, *Physalis minima* and *Cleome viscosa* were major broad leaved weeds in Bakawand and Jagdalpur (Table 2).

Under grassy weeds, heavy infestation of *Digitaria adscendens* was found in wheat crop under late sown (December-January). This weed was reported to suppress wheat (Bhan 1992). The grasses like *Dicanthium annulatum* and *Phalaris minor* were lesser in relative density in Bakawand, Bastar, Tokapal, but little higher in Lohandiguda and Jagdalpur. Distribution of weed flora was found dependable on land situation (Streibig *et al.* 1984).

In Rabi season, IVI ranged from 0% of *Phalaris minor* in Tokapal, block and 42.02% of *Chenopodium album* in Jagdalpur block. The maximum important value index was noticed in *Chenopodium album* (30.25, 35.19, 15.94, 12.40 and 42.02 % in Bakawand, Bastar, Tokapal, Lohandiguda and Jagdalpur, respectively) during survey (Table2).

Weed flora of non-cropped areas

Non-cropped area constituted of forest plantation, wastelands, roadsides and extreme uplands in the study. In all blocks, 11 species were observed in surveyed areas of which 3 were grassy and 8 were broadleaved weeds (Table 3). *Chromolaena odorata* (20.54, 23.33, 17.93, 22.73 and 17.27 in Bakawand, Bastar, Tokapal, Lohandiguda and Jagdalpur, respectively) was higher in arresting relative density whereas *Hypstis suaveolens* . (22.32, 25.36, 19.31, 25.31 and 19.09% in respective blocks) was next to *Chromolaena odorata* in plantation forest and boundaries of forest.

SUMMARY

The cultivated area of upland is having serious problem of weed infestation which declines the yield of upland crops. Some weeds spread fast in this region because of favourable environment in crops, forest plantation and natural forest. Weed dominated blocks namely Bakawand, Batar, Tokapal, Lohandiguda and Jagdalpur selecting 7 villages from each block of Bastar district during August-September and February-March, 2008 under national Agricultural Innovative Project. In all the blocks, *Spilanthus acmella*, *Celosia argentia* and *Digitaria adscendens* were the most dominant weeds in upland cropping. Among these weeds, *Sphaeranthus indicus* (17.65, 15.14, 22.41, 15.00 and 11.40% in Bakawand, Bastar, Tokapal, Lohandiguda

Table 2. Weed flora in different blocks of Bastar district in Rabi cropping

Rabi cultivation	Bakawand			Bastar			Tokapal			Lohandiguda			Jagdapur		
	RD (%)	RF (%)	IVI (%)	RD (%)	RF (%)	IVI (%)	RD (%)	RF (%)	IVI (%)	RD (%)	RF (%)	IVI (%)	RD (%)	RF (%)	IVI (%)
<i>Chenopodium album</i>	14.12	16.13	30.25	12.96	22.22	35.19	17.24	37.50	15.94	20.00	35.94	12.40	14.81	27.21	42.02
<i>Melilotus indica</i>	7.06	9.68	16.74	7.41	11.11	18.52	6.90	12.50	7.25	10.00	17.25	7.44	11.11	18.55	29.66
<i>Melilotus alba</i>	8.24	6.45	14.69	8.33	5.56	13.89	8.62	0.00	8.70	5.00	13.70	8.26	7.41	15.67	23.08
<i>Anagalis arvensis</i>	5.88	6.45	12.33	6.48	5.56	12.04	5.17	0.00	5.80	5.00	10.80	6.61	7.41	14.02	21.43
<i>Vicia sativa</i>	4.71	3.23	7.93	5.56	0.00	5.56	3.45	0.00	4.35	10.00	14.35	5.79	3.70	9.49	13.19
<i>Medicago denticulata</i>	7.06	6.45	13.51	7.41	5.56	12.96	6.90	0.00	7.25	5.00	12.25	7.44	7.41	14.85	22.26
<i>Physalis minima</i>	3.53	3.23	6.76	1.85	0.00	1.85	0.00	0.00	0.00	0.00	0.00	2.48	3.70	6.18	9.88
<i>Cleome viscosa</i>	5.88	6.45	12.33	6.48	5.56	12.04	5.17	0.00	5.80	5.00	10.80	6.61	7.41	14.02	21.43
<i>Dicanthium annulatum</i>	7.06	6.45	13.51	7.41	5.56	12.96	6.90	0.00	7.25	5.00	12.25	7.44	7.41	14.85	22.26
<i>Trianthema portulacastrum</i>	3.53	3.23	6.76	4.63	0.00	4.63	1.72	0.00	2.90	0.00	2.90	4.96	3.70	8.66	12.36
<i>Phalaris minor</i>	2.35	6.45	8.80	3.70	5.56	9.26	0.00	0.00	1.45	5.00	6.45	4.13	7.41	11.54	18.95
<i>Sphaeranthus indicum</i>	17.65	12.90	30.55	15.74	16.67	32.41	22.41	25.00	20.29	15.00	35.29	14.88	11.11	25.99	37.1
<i>Digitaria sanguinalis</i>	12.94	12.90	25.84	12.04	16.67	28.70	15.52	25.00	14.49	15.00	29.49	11.57	7.41	18.98	26.39

RD - Relative density; RF - Relative frequency; IVI - Important value index

Table 3. Weed flora in different blocks of Bastar district in non-cropped areas

Non-cropped area	Bakawand			Bastar			Tokapal			Lohandiguda			Jagdapur		
	RD (%)	RF (%)	IVI (%)	RD (%)	RF (%)	IVI (%)	RD (%)	RF (%)	IVI (%)	RD (%)	RF (%)	IVI (%)	RD (%)	R.F. (%)	IVI (%)
<i>Chromalaena odorata</i>	20.54	19.23	39.77	23.33	13.89	37.22	17.93	26.67	44.60	22.73	26.67	49.39	17.27	19.23	36.50
<i>Hyptis suaveolens</i> (L.)	22.32	15.38	37.71	25.56	13.89	39.44	19.31	20.00	39.31	25.76	20.00	45.76	19.09	15.38	34.48
<i>Blumea lacera</i>	14.29	15.38	29.67	15.56	13.89	29.44	13.10	20.00	33.10	12.12	20.00	32.12	10.91	15.38	26.29
<i>Lantana camera</i>	4.46	7.69	12.16	3.33	8.33	11.67	5.52	6.67	12.18	3.03	6.67	9.70	5.45	7.69	13.15
<i>Rumex dentatus</i>	3.57	3.85	7.42	2.22	5.56	7.78	4.83	0.00	4.83	1.52	0.00	1.52	4.55	3.85	8.39
<i>Gnaphalium supinum</i>	12.50	11.54	24.04	13.33	11.11	24.44	11.72	13.33	25.06	9.09	13.33	22.42	9.09	11.54	20.63
<i>Tribulus terrestris</i>	3.57	3.85	7.42	2.22	5.56	7.78	4.83	0.00	4.83	3.03	0.00	3.03	5.45	3.85	9.30
<i>Themeda triandra</i>	7.14	3.85	10.99	6.67	5.56	12.22	7.59	0.00	7.59	0.00	0.00	0.00	3.64	3.85	7.48
<i>Cynodon dactylon</i>	3.57	3.85	7.42	2.22	5.56	7.78	4.83	0.00	4.83	7.58	0.00	7.58	8.18	3.85	12.03
<i>Eragrostis pilosa</i>	5.36	7.69	13.05	4.44	8.33	12.78	6.21	6.67	12.87	6.06	6.67	12.73	7.27	7.69	14.97
<i>Paspalidium flavidum</i>	2.68	7.69	10.37	1.11	8.33	9.44	4.14	6.67	10.80	9.09	6.67	15.76	9.09	7.69	16.78

RD - Relative density; RF - Relative frequency; IVI - Important value index

and Jagdalpur, respectively) was most dominant weeds followed by *Chenopodium album* (14.12, 12.96, 17.14, 20.00 and 14.81% in respective blocks) and *Digitaria adscendens* (12.94, 12.04, 15.52, 15.00 and 7.41% in Bakawand, Bastar, Tokapal, Lohandiguda and Jagdalpur, respectively). *Chromalaena odorata* (20.54, 23.33, 17.93, 22.73 and 17.27 in Bakawand, Bastar, Tokapal, Lohandiguda and Jagdalpur, respectively) and *Hyptis suaveolens* L. (22.32, 25.36, 19.31, 25.31 and 19.09% in respective blocks) were higher in arresting relative density in respective blocks.

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